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Indian Standard

GENERAL REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR AIRCRAFT

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Indian Standard

GENERAL REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR AIRCRAFT

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Indian Standard

GENERAL REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR AIRCRAFT

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 26 July 1982, after the draft finalized by the Aircraft Electrical Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard covers the general requirements applicable for all electrical equipment for use in aircraft, depending on special severities to which they are subjected in actual service. This standard shall, therefore, be used in conjunction with the individual equipment specifications.

0.3 During recent years, there has been an increasing demand for electrical equipment for use in aircraft. A series of Indian Standards has, therefore, been broughtout in order to provide the necessary guidance regarding the technical and other requirements consistent with optimum quality and uniform test methods of such equipment for use in aircraft.

0.4 In preparing this standard, considerable assistance has been derived from ' BS 3G 100 : General requirements for equipment for use in aircraft ' issued by British Standards Institution.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the general requirements for all types of electrical equipment intended for use in aircraft. This standard shall be read in conjunction with the detailed individual equipment standards.

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*Rules for rounding off numerical values (*revised*).

2. GENERAL REQUIREMENTS

2.0 All electrical equipments for use in aircraft shall conform to the general requirements specified in this standard. Particular requirements, with the degree of severity stipulated in individual standards, shall also be made applicable and tested according to the methods recommended therein.

2.1 Temperature and Pressure

2.1.1 Aircraft electrical equipment shall be classified as follows for purposes of temperature and pressure severities. This is based on their ability to function satisfactorily under various conditions of temperature and pressure up to the declared altitude:

Class A Equipment suitable for use in the engine bay.

Class B Equipment other than those in engine bay and pressure cabins.

Class C Equipment suitable for use in pressure cabins.

Equipment shall be capable of withstanding the most adverse conditions over the range of temperature and pressure and up to the altitude for its declared class.

For Class A and Class B equipment for use in supersonic aircraft, allowance shall also be made for adiabatic temperature rise. The equipment shall also meet any special temperature requirements agreed upon between the manufacturer and the purchaser.

2.1.2 Equipment cooled by outside air shall be capable of withstanding the maximum ambient temperature and pressure up to the declared altitude, allowances being made for the following:

a) Heating of air by adiabatic compression in high speed aircraft, approximately $\frac{V^2}{161}$ degrees centigrade;

where V is the true airspeed in kilometres/hour

b) Any absorption of heat from ducting or warm air; and

c) Increase of pressure due to the forward speed of the aircraft.

2.2 Climatic Conditions

2.2.0 With regard to the ability to operate satisfactorily in different severities of climatic conditions, aircraft electrical equipment shall be classified as follows:

a) Class I Equipment suitable for use in all aircraft, and

b) Class II Equipment suitable for use in pressure cabin or in aircrafts certified for use in temperate zones below 6100 m.

2.2.1 *Icing* — Electrical equipment for use in exposed conditions in the aircraft shall be proof against ice formation and mechanical jamming by ice.

2.2.2 *Salt Mist* — The equipment shall be resistant to the corrosive effects of salt laden atmospheres which exist at sea, in coastal areas and in desert areas. It shall be capable of withstanding salt mist tests up to the severity prescribed in the individual equipment specification.

2.2.3 *Humidity* — Equipment intended to be exposed to humid environment of tropically wet areas shall be capable of withstanding the cyclic varying temperatures at specified percentage of relative humidity.

2.2.4 *Mould Growth* — The equipment shall be inherently resistant to fungus growth or shall be insulated by spraying with an aqueous suspension of moulded spores.

2.3 Differential Pressure — Equipment mounted within the pressurised zone of an aircraft shall be capable of withstanding excess pressure, differential pressure and rapid decompression tests as prescribed in the individual equipment specification [*see* also IS : 8252 (Part XI) - 1976*].

2.4 Flame Proofness — Equipment liable to come into contact with flammable fluids and vapours shall be designed to be flame proof and intrinsically safe from causing fire hazard in the environment.

2.5 Magnetic Influence — Equipment shall be so designed that the external magnetic fields produced by it under all conditions of operation shall be as small as practicable. The compass safe distance of the equipment shall be declared by the manufacturer and shall be not less than the minimum value specified in the relevant equipment specification. The compass safe distance for electrical equipment likely to be mounted near a magnetic compass shall not exceed 300 mm [*see* also IS : 8252 (Part XVIII)- 1978*).

2.6 Water Proofness — Equipment intended to operate in conditions where it is likely to be exposed to rain or dripping water shall be spray proof (proof against driving rain) or drip proof (proof against drops of water) as the case may be [*see* also IS : 8252 (Part VI)-1976*].

2.7 Fluid Contamination — The equipment shall be so constructed that its operation shall not be affected adversely by contaminating fluids to which it may be exposed.

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*Environmental tests for aircraft equipment:
Part XI Differential pressure.
Part XVIII Magnetic influence.
Part VI Water-proofness.

2.8 Normal Acceleration

2.8.1 The equipment manufacturer shall declare the normal acceleration class and grade to which the equipment conforms. Equipment shall be classified as shown in Table 1 and graded as follows:

a) Grade N_1 Equipment that will continue to function correctly during and after being subjected to proofload due to acceleration appropriate to its class.

b) Grade N_2 Equipment that regains its ability to function correctly, immediately after removal of the proofload due to acceleration appropriate to its class and will also continue to function correctly during and after being subjected to a smaller load due to acceleration, the value of which shall, if applicable, be specified in the relevant equipment specification.

2.8.2 Equipment shall be designed with an ultimate strength of at least 1·3 times the proof load due to acceleration appropriate to the relevant acceleration class given in Table 1. However, accelerations greater than those given in Table 1 may be experienced by equipment in particular regions of an aircraft, for example, under carriage legs, tips, tips of flexible wings, etc. Aircraft designers shall specify any increased loading requirements to which the equipment shall be subjected. Where equipment contains rotating parts that have an appreciable polar moment of inertia, account shall be taken of gyroscopic couple effects that may arise during certain aircraft manoeuvres. The rate of precession shall be assumed to be as follows:

Acceleration Class I	5 radians/second
Acceleration Class II	3 radians/second

2.9 Crash Acceleration

2.9.1 Under crash conditions, accelerations greater than those specified under normal conditions may be encountered. The limiting requirements under these conditions consistent with safety during an emergency landing shall be as given in Table 2.

2.9.2 Equipment shall be designed with an ultimate strength of at least greater than the ultimate factor that limits the maximum proofload due to acceleration appropriate to the relevant acceleration class. It shall also be designed and constructed not to break loose from its mountings under the application of limiting loads due to acceleration. Certain items of equipment, for example, fire-protection equipment, may be required to withstand, or continue to function during local accelerations that are greater than those given in Table 2. These limiting accelerations shall be as given in relevant equipment specification.

TABLE 1 ACCELERATION CLASSES (NORMAL CONDITIONS) AT CENTRE OF GRAVITY OF AIRCRAFT

(*Clauses* 2.8.1, 2.8.2 *and* 2.9.4)

Typical Application	Installation		Typical Manoeuvres Covered	Resultant Proof Acceleration*	Components of Proof Acceleration, I_n*			Acceleration Class
	Position	Altitude			x	y	z	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Highly manoeuvrable (military aircraft)	Any position	Any altitude	—	17 In any direction	—	—	—	N1A(i)
		Fixed altitude	Pull out, landing and assisted take-off	17	±9	±2·5	±14	N1B(i)
			Roll, down gust	17	0	±14	±9	N1B(i)
	Fuselage†	Any altitude		13 In any direction	—	—	—	N1A(ii)
		Fixed altitude	Pull out, spin, roll	10	±2·5	±2	−9	N1B(ii)
			Landing and assisted take-off	13	±9	±2·5	−8·5	N1B(ii)
			Down gust	−5	+1	0	+4·50	N1B(ii)
Other military aircraft and fully aerobatic civil aircraft	Any position	Any altitude	—	7 In any direction	—	—	—	N2A(i)
		Fixed altitude	Pull out	7	±2·5	±1	−6	N2B(i)
			Down gust	4	+1	0	+3·5	N2B(i)
			Roll	5	0	±4	−2·5	N2B(i)
	Fuselage†	Any altitude	—	6·50 In any direction	—	—	—	N2A(ii)
		Fixed altitude	Pull out, roll	6·50	±2	±1	−6	N2B(ii)
			Down gust	−4	+1	0	+3·50	N2B(ii)

(*Continued*)

TABLE 1 ACCELERATION CLASSES (NORMAL CONDITIONS) AT CENTRE OF GRAVITY OF AIRCRAFT — *Contd*

TYPICAL APPLICATION	INSTALLATION		TYPICAL MANOEUVRES COVERED	RESULTANT PROOF ACCELERATION*	COMPONENTS OF PROOF ACCELERATION, I_n*			ACCELERATION CLASS
	Position	Altitude			x	y	z	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Military and civil rotorcraft and semi-aerobatic civil aircraft	Any position	Any altitude	—	5·50 In any direction	—	—	—	N3A(i)
		Fixed altitude	Pull out, roll	5·50	±2	±2	−4·50	N3B(ii)
			Down gust	−2·50	+1	0	+2	N3B(ii)

NOTE — The designation of acceleration class shall be interpreted as follows:

Class N1A(i) — N denotes the condition (Normal), 1A denotes the application and type respectively, and (i) denotes the altitude.

*The proof accelerations expressed in I_n units refer to the standard sea level acceleration due to gravity, that is, 9·807m/s^2.

†The 'fuselage' position shall be taken as applying only to equipment within a radius of one quarter of fuselage length from the centre of gravity.

TABLE 2 ACCELERATION CLASSES (CRASH CONDITIONS) AT CENTRE OF GRAVITY OF AIRCRAFT

(*Clauses* 2.9.1, 2.9.2 *and* 2.9.4)

Typical Application	Equipment Location	Maximum Resultant Proof Acceleration I_{n*}	Maximum Components of Proof Acceleration, I_{n*}			Acceleration Class
			x	y	z	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Highly manoeuvrable (military aircraft)	Where, if it broke loose, it could either injure occupants at their crash station or prevent the use of emergency equipment or exits	25·50	−25	±4	0	C 11
	Where, if it broke loose, it could injure occupants at their crash station	11	−10	±4	0	C 12
Other military aircraft and fully aerobatic civil aircraft	Where, if it broke loose, it could injure occupants at their crash stations or prevent the use of emergency equipment or exits	10	−9	±2·25	−4·50 +4	C 13
Rotorcraft (military and civil)	Where, if it broke loose, it could injure occupants at their crash stations or prevent the use of emergency equipment or exits	6 In any direction	—	—	—	C 14

*The proof accelerations expressed in I_n units refer to the standard sea-level acceleration due to gravity, that is, 9·807 m/s^2.

2.9.3 The equipment manufacturer shall declare the crash acceleration class and grade to which the equipment conforms. The grades of crash acceleration are indicated below:

Grade C_1	Equipment that is capable of functioning correctly during and after being subjected to limiting loads due to acceleration.
Grade C_2	Equipment that regains its ability to function correctly immediately after removal of the limiting loads due to acceleration.
Grade C_3	Equipment that may cease to function during and after being subjected to limiting loads due to acceleration.

2.9.4 Equipment shall be tested to determine its compliance with requirements in **2.8.2** and **2.9.2** as applicable. The loads applied to the equipment shall be the maximum proofloads due to accelerations given in Tables 1 and 2 appropriate to the mounting altitude and its acceleration grade. Equipment which may be mounted in any altitude shall be subjected to the appropriate resultant proofloads due to accelerations applied in the directions of three mutually perpendicular planes and the planes of any suspected weakness. Equipment intended to be mounted always in one fixed altitude shall be subjected to the appropriate resultant proofloads due to accelerations applied in each of the resultant directions calculated from aircraft body axis x, y and z as stated in Tables 1 and 2. It should be noted that the inertia loads would be in the opposing direction to the accelerations. The maximum resultant proofloads due to acceleration shall be applied for a period not less than 10 s. If the tests are made on a centrifuge, the radius of gyration should be such as to ensure that the load due to acceleration is sensibly constant over the whole of the equipment under test.

2.10 Vibration

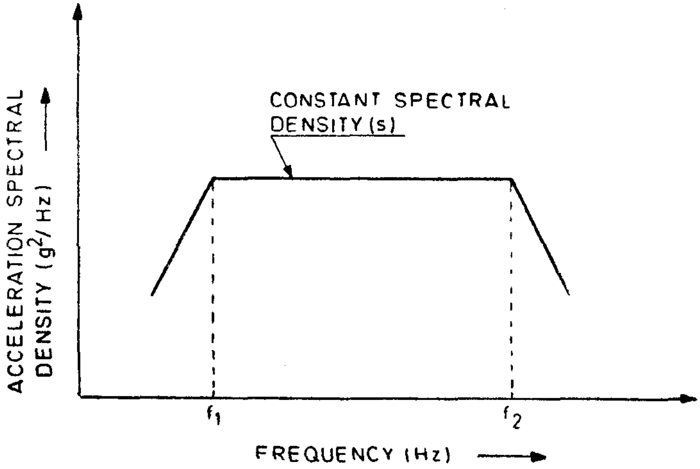
2.10.0 Items of airborne equipment shall be designed to function satisfactorily throughout their service life in conditions of vibration for which they are declared.

2.10.1 A vibration severity shall be defined by a combination of the parameters such as frequency range, vibration level and duration. The vibration conditions in aircraft are divided into a number of categories, each of which is associated with one or more flight conditions and equipment locations.

2.10.2 In view of the severity of vibration requirements encountered, the aircraft shall be divided into four equipment regions as follows:

Region A	The extremities of the aircraft and any part in which equipment is mounted close to the aircraft skin so that transmission paths from the structure to the equipment are short.
Region B	The central fuselage of the aircraft, but excluding parts of the central fuselage in which equipment is in Region A.
Region C	Equipment racks and instrument packs designed to hold a number of units.
Region D	Close proximity to a main power plant, but excluding direct contact with the power plant.

2.10.3 *Regions A and B* — There are five vibration categories as given below for Regions *A* and *B*, each of which is associated with a flat acceleration spectral density between lower and upper frequency limits f_1 and f_2 as given in Fig. 1.



NOTE — Attenuation below f_1 and above f_2 shall be not less than 6 dB per octave.

FIG. 1 TEST SPECTRAL FOR EQUIPMENT REGIONS A AND B.

CATEGORY	VALUE OF ACCELERATION SPECTRAL DENSITY (g^2/Hz) (s)	RMS OF LEVEL BETWEEN f_1 AND f_2
1	0·001	$\sqrt{0{\cdot}001 \times (f_2 - f_1)}$
2	0·005	$\sqrt{0{\cdot}005 \times (f_2 - f_1)}$
3	0·01	$\sqrt{0{\cdot}01 \times (f_2 - f_1)}$
4	0·02	$\sqrt{0{\cdot}02 \times (f_2 - f_1)}$
5	0·05	$\sqrt{0{\cdot}05 \times (f_2 - f_1)}$

2.10.4 The frequency limits f_1 and f_2 for any vibration category shall be determined by the flight condition of the aircraft and the equipment location, as shown in Table 3.

2.10.5 The equivalent durations for the five vibration categories listed in **2.10.3** are given in Table 4.

2.10.6 When an equipment is designed for general application in different aircraft, the equipment designer may make an endurance test in any of the categories 2, 3, 4 or 5 using wide band random motion for a duration of 50 h. The overriding aim of the 50 h endurance test is that every resonance frequency of the equipment in the range of frequencies which will be encountered in service shall be subjected to 50 h endurance test at the highest level of vibration appropriate to that frequency range. In general, for equipment fitted in aircraft zones not subject to high external noise levels, category 3 should prove to be generally acceptable test-level, although for rack-mounted equipment, category 2 may prove suitable.

2.10.7 When there are special vibratory characteristics for the aircraft, a test schedule shall be recommended by the type approving authority, which shall take into account the special characteristics, for example, the discrete frequencies encountered in rotorcraft or propeller driven aircraft.

The equipment shall be functionally checked as required by the individual specification. Unless otherwise stated in the individual specification, the specimen shall be vibrated in three mutually perpendicular axes in turn corresponding to vertical, lateral and fore and aft vibration of the aircraft. Of the total test duration in each category, 0·4 shall be in a direction appropriate to vertical, 0·4 in a direction appropriate to lateral and 0·2 in a direction appropriate to the fore and aft vibration of the aircraft.

TABLE 3 FREQUENCY LIMITS

(*Clause* 2.10.4)

SL NO.	FLIGHT CONDITION	EQUIPMENT REGION					
		A and D			B and C		
		f_1	f_2	Category	f_1	f_2	Category
(1)	(2)	(3) (Hz)	(4) (Hz)	(5)	(6) (Hz)	(7) (Hz)	(8)
i)	Atmospheric turbulence (severe)	10	60	4	10	60	3
ii)	Atmospheric turbulence (normal)	10	60	3	10	60	2
iii)	Unprepared runway operation	10	60	4	10	60	4
iv)	Normal runway operation	10	60	3	10	60	2
v)	High external noise levels > 140 dB	60	1000	3	60	1000	2
vi)	High external noise levels > 150 dB	60	1000	4	60	1000	3
vii)	High external noise levels > 160 dB	60	1000	3	60	1000	4
viii)	Aerodynamic buffeting or transonic flight	10	1000	3	10	1000	2
ix)	Low-level high speed flight	10	1000	3	10	1000	2
x)	Cruise (supersonic)	10	1000	2	10	1000	1
xi)	Cruise (subsonic)	10	1000	1	—	—	—

NOTE 1 — Flight condition 1 is intended to cover turbulent atmospheric conditions such as severe thunderstorms, which would normally be avoided, but in some circumstances may have to be encountered.

NOTE 2 — Flight condition 2 is intended to cover conditions in which action may be taken to avoid severe atmospheric disturbance.

NOTE 3 — Flight condition 3 is intended to apply to operation from rough fields, stony or potholed ground, or any other surface not normally considered suitable for aircraft operation.

NOTE 4 — Flight conditions 5, 6 and 7 are intended to apply to equipment which is mounted in a reverberant enclosure. If the enclosure is absorptive, the category of vibration may be numerically increased by 1. The test covers only vibration which is transmitted to the equipment through its mountings and an additional acoustic test may be required. When ground engine running produces high noise level equivalent to those in Table 1, the appropriate time shall be included in the assessment.

NOTE 5 — Flight condition 11 for equipment in Region B is considered to result in negligible vibration.

TABLE 4 EQUIVALENT DURATION FOR VIBRATIONS

(*Clause* 2.10.5)

1 Hour in Category	Equivalent Hours in Category			
	5	4	3	2
(1)	(2)	(3)	(4)	(5)
4	0·101	—	—	—
3	0·018	0·177	—	—
2	0·003 2	0·031	0·177	—
1	0·000 056	0·000 56	0·003 2	0·018

Note — Care should be taken to ensure that the correct durations are obtained when different frequency ranges apply to the flight conditions in the most severe category.

2.10.8 An initial resonance search shall be carried out at a vibration level appropriate to the most severe category of the endurance test, by making a study of the complete frequency range to investigate the behaviour of the specimens under vibration in all directions. Vibration shall be applied sinusoidally at those reasonance frequencies at which failure or malfunction is likely to occur during the specimen life. The number of such frequencies shall not exceed four unless specified otherwise by the type approving authority. A final resonance search similar to the initial resonance search shall be performed at the same vibration levels. The specimen shall be functionally checked as required by the relevant specification.

During endurance test, the specimens shall be functioning and shall be checked for such time and in such a way as prescribed by the individual specification. Account shall be taken of the need to function under vibratory conditions and the possible effects of functioning on the dynamics of the equipment.

2.11 Electrical Insulation Tests

2.11.1 The insulation resistance shall conform to the values given in Table 5 when measured as given in **2.11.2**.

2.11.2 The insulation resistance shall be measured between insulated live parts and between insulated live parts joined together and frame at an electrical potential of not less than 500 V dc. Unless capacitors, semiconductors or other limiting components are fitted, the insulation resistance shall be similarly measured between:

a) dc powered circuits and frame, with the ac circuits connected to frame, at a potential of 50 ± 2 V dc; and

b) ac powered circuits and frame, with the dc circuits connected to frame, at a potential of 200 ± 5 V dc.

TABLE 5 MINIMUM VALUES FOR INSULATION RESISTANCE

(*Clause* 2.11.1)

CATEGORY	TYPE OF EQUIPMENT IN THE CATEGORY	MINIMUM INSULATION RESISTANCE (IN MEGOHMS)			
		Between Insulated Live Parts		To Frame	
		In conjunction with climatic tests	In conjunction with non-climatic tests	In conjunction with climatic tests	Inconjunction with non-climatic tests
(1)	(2)	(3)	(4)	(5)	(6)
A	Wiring components, for example, terminal blocks, plugs, switches and Sockets	100	100	200 divided by the number of terminals connected together	
B	Rotating machinery (excluding indicating instruments)	0·5	20	0·5	20
C	Electronic equipment, incorporating semiconductor devices	2	10*	2	10*
D	Indicating instruments and equipment other than those in categories A, B and C	5	20	5	20

*When testing individual components, this figure shall be increased to a minimum of 50 megohms.

2.11.3 The leakage current of the complete equipment, sub-assembly and chords, including all semiconductors and capacitors, shall be measured between the following:

a) Individual circuits not normally connected together; and

b) The frame and all live parts connected together at a potential of 28±2V dc and with a 0·5 megohm resistor in series.

A pure dc source, for example, a battery, shall be used for the measurements. The leakage current shall not exceed 3 μA.

Power devices (excluding electronic equipment) shall be subjected to a high voltage test from a low impedance source. The equipment shall be subjected to an electrical potential of 500 V at 50 cycles for dc equipment and at 1 000 V at 50 cycles for ac equipment. The steady state potential shall be applied for 5 to 10 s between the terminals of the equipment and its frame. No breakdown shall occur.

2.12 Radio Interference

2.12.1 Equipment shall be so designed that the emission of radio noise is reduced to a minimum, so that the radio noise voltage shall not exceed the limits given in Table 6 for the range of frequencies 0·15 to 500 MHz. In addition, when it is necessary to avoid interference with low frequency navigation equipment, the requirements for the frequency range 0·050 to 0·15 MHz shall also be met. Where conditions of use of the equipment require suppression of interference, the components for suppression purposes together with necessary screening should, where practicable, be incorporated in the equipment itself.

2.12.2 When the radio noise voltages are not reduced to the levels stipulated in Table 6, within the equipment, the equipment shall be effectively screened and provided with cable fittings suitable for the attachment and bonding of screened cables for connection to external suppressors, such suppressors being selected to provide the required suppression.

TABLE 6 LIMITS OF RADIO NOISE VOLTAGES

Frequency MHz	Limit (At Equipment Terminals) μV
From 0·05 to 0·15	$450/f$
Over 0·15 to 0·45	$10/f^3$
Over 0·45 to 150	100
Over 150 to 500	100

2.12.3 The tests shall be made in a double screened room having adequate filters in all incoming supply lines. If this is impracticable, precautions shall be taken to ensure that the results are not affected by noise voltages and fields other than those due to the equipment under test. Line stabilizing networks shall be used to prevent the results from being affected by variations of impedance of the electrical supply and load circuits. The equipment under test shall be connected to the live stabilizing networks by short lengths of screened cable, the screening being connected to the equipment and the stabilizing networks at the appropriate extremities. Cables in dissimilar circuits should not be in a common screen.

The radio noise voltage at the terminals of unscreened interconnections between units of multi unit equipment shall be measured by connecting the input of the measuring set through a terminating unit between each terminal and the earthed metal work nearest to the terminal. No stabilizing networks are needed in these lines, provided the equipment is in a normal condition of operation with all units connected.

Measurements on terminals intended to be connected to equipment or wiring, for example, power supply circuits, external to the equipment under test, shall be made using the specified stabilizing networks. When the connection of these networks causes malfunctioning of the equipment, appropriate test methods shall be subjected to agreement of the approving authority.

2.13 Flame Proofness — Equipment likely to come into contact with inflammable fluids or vapours shall be so designed with due regard to its manner of installation, as to render it incapable of causing external ignition. Such equipment shall be capable of withstanding tests for flame proofness (*see* IS : 2148-1968*).

3. PARTICULAR DESIGN REQUIREMENTS

3.0 The equipment shall conform to detailed design requirements in respect of components like bearings, terminals, brushes and brushgear oil seals as may be prescribed in the individual specifications for the equipment. It shall be so designed as to minimise accidental damage during handling and installation.

3.1 Materials and Processes

3.1.1 Materials and components used in the equipment shall conform to the relevant Indian Standard specifications.

3.1.2 In the construction of the equipment, materials which are liable to cause any serious alteration to performance, or any deterioration during declared storage life shall not be used. Materials (metallic and non-metallic) shall be suitable for their particular purposes and shall be capable of maintaining all their essential properties in service.

3.1.3 All metallic materials used shall be either resistant to corrosion or so treated as to resist corrosion. Where the use of dissimilar metals in contact or juxtaposition is specifically required, the metals shall be protected in an adequate manner.

3.1.4 Materials which would deteriorate rapidly under conditions of service shall not be used for rendering joints moisture proof. Ordinary rubber shall not be used where petrol, oil or other deleterious fluids are likely to penetrate.

3.1.5 During operation of the equipment, the maximum temperature to which any material is subjected shall not cause deterioration of the essential properties of the material, within the declared life of the equipment, sufficient to cause its failure.

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*Specification for flameproof enclosures of electrical apparatus (*first revision*).

3.1.6 All materials used for electrical installation shall, by their inherent quality, treatment and manner of application, enable the equipment to to withstand the extreme climatic conditions likely to be encountered in service life of the aircraft. Windings shall be suitably impregnated.

3.1.7 All equipment intended for installation in a designated fire zone and which must function in the event of a fire, shall be capable of functioning during and after subjection for a period of 5 min to a flame having a temperature of 1 100°C. Such equipment shall be declared as 'Fire Resistant Grade I '.

3.1.8 All equipment intended for installation in a designated fire zone and to contain inflammable fluids shall be capable of withstanding for 5 min a flame having a temperature of 1 100°C without leakage of such fluids. Such equipment shall be declared as ' Fire Resistant Grade II '.

3.1.9 Components which are intended for passage through a fire proof bulkhead shall, when installed in such a bulkhead, be capable of withstanding for 15 min a flame having a temperature of 1100°C without allowing flame penetration through the bulkhead. Such components shall be declared as ' Fire Proof '.

3.1.10 Other components of equipment shall not constitute a fire risk and shall, if necessary, be coated with suitable materials to ensure fire proofness.

3.2 Soldered electrical joints shall be inherently of adequate mechanical strength appropriate to the size of the conductor. Resin type of fluxes shall be used in making such joints and any excess flux after completion of the soldering shall be removed or neutralised.

3.3 Suitable types of oil or grease shall be used for lubrication of the equipment appropriate to the temperature condition encountered in service. Suitable means of cooling, depending on the temperature and density of air, shall be adopted.

3.4 External finishes, fittings and seals shall be capable of withstanding humidity encountered in service conditions.

4. DECLARATION AND MARKING

4.1 The marking and declaration shall conform to IS : 7855-1975*.

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*Form of declaration of performance of aircraft electrical equipment.